NON-PUBLIC?: N
ACCESSION #: 8704130053
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Oconee Nuclear Station PAGE: 1 of 5

DOCKET NUMBER: 05000287

TITLE: Relay Actuation Starts Both Keowee Units and Causes a Load Shed
EVENT DATE: 03/05/87 LER #: 87-002-00 REPORT DATE: 04/03/87

OPERATING MODE: N POWER LEVEL: 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Philip J. North, Licensing TELEPHONE #: 704-373-7456

COMPONENT FAILURE DESCRIPTION:
CAUSE: E

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On March 5, 1987 at 1515 with Unit 3 in a refueling outage, personnel began cutting on the right hand side of panelboard EB-1 in order to install a new watt-hour meter. Cutting induced vibration caused actuation of the startup transformer (CT-3) lockout relay. Thus causing loss of all incoming AC power to Unit 3. Nonessential electrical equipment was then load shed, and both Keowee Hydro units started. Power was reestablished from Keowee within the required amount of time.

The root cause of this incident was the failure of the design review process for this modification to adequately address the interactions of nearby equipment during the installation process.

There were no radiological releases as a result of this event. As such, the health and safety of the public were not affected.

(End of Abstract)

TEXT: PAGE: 2 of 5

BACKGROUND:

The Main Feeder Bus Monitor (MFB) Panels constantly monitor the supply of electrical power to the unit's auxiliary loads. If the incoming power is lost for 21 seconds a load shed of the nonessential loads occurs. Immediately after the 20 second time delay, a signal is sent to Keowee Hydro units to start. Approximately ten seconds after the load shed actuation, the Keowee Standby Breakers close in to the Standby Bus. The Emergency Power Switching Logic (EPSL) constantly monitors sources of power available to the auxiliary loads on each unit. When incoming power is lost, the EPSL will search the available power sources and perform the necessary switching. During Unit-3's refueling outage, the incoming power to the unit was from the Startup Transformer (CT-3).

Modifications are routinely done at Oconee with nearby equipment energized. It is not always feasible to take all of the nearby equipment out of service.

DESCRIPTION OF EVENT:

On February 21, 1987, with Unit-3 in a refueling outage, the Unit-3 Supervisor granted permission to begin work on the installation of a modification in the Unit-3 Control Room to provide a method of power production information exchange between dispatchers and the plant.

Work progressed on the installation of the modification until March 5, 1987. At this time, the craft personnel got to the point in the installation procedure where they had to make a cut on panelboard EB-1 for a new watt-hour meter for transformer CT-4. CT-4 supplies the redundant 4160 volt standby buses with power from Keowee through the underground emergency power fee
er. At this time, EB-1 had electrical relays energized (including the CT-3 lockout relay) that were not related to this modification. The craft personnel made a couple of starter holes with a portable drill for their reciprocating saw. The craft personnel then chose an 18 tooth per inch blade for the saw in order to make the cut. A hole was then cut in the left hand side of the panel board in the morning of March 5, 1987 without any problems.

At 1515 on March 5, 1987, the craft personnel went to make a second hole in the right hand side of the panelboard with the same saw after drilling another starter hole. While they made the horizontal cut on the lower left hand corner of the proposed hole, the CT-3 lockout relay actuated.

Upon actuation of the CT-3 lockout relay: all incoming AC power to Unit-3 was lost; non-essential electrical equipment was load shed; and both Keowee Hydro units started. The Emergency Power Switching Logic (EPSL) performed as designed and reestablished power to the unit from Keowee through CT-4 within 23 seconds.

Later, control room personnel swapped the power supply to standby bus transformer CT-5. Both Keowee Hydro units were secured at 1750.

No work resumed on this modification until March 6, 1987. At 1201, the incoming AC power to Unit-3 was manually transferred to the Standby Bus. When the craft personnel resumed cutting on panelboard EB-1, the previously reset CT-3 lockout relay tripped. Thus confirming that the vibration induced into the panelboard by this cutting method, had caused the previous trip of the relay on March 5, 1987. There was no electrical switching at this time as the unit's incoming power was supplied through CT-5 rather than CT-3.

CAUSE OF OCCURRENCE:

The CT-3 lockout relay is an Electro Switch, Model No. 7810LH, relay. After discussions with appropriate personnel, it is concluded that this relay is appropriately positioned on EB-1 and is fully operable. It was also concluded that the magnitude of force induced into the lockout relay from cutting on the panelboard caused the lockout relay to trip.

Modifications are a continuous process in order to update the nuclear facility. During the installation of these modifications it will not always be feasible to isolate all the equipment that the modification interacts with or isolate all the equipment in the vicinity. The modification program defines and uses good practices on how to check for undesirable "system to system" interactions during installation. The modification program also defines ways to ascertain the proper sizing and physical placement of the equipment. However, the modification program does not provide clear guidance to the Accountable Engineer concerning physical interactions or reactions of nearby equipment during the modification installation process (i.e. such as inducing vibration into a panelboard that has electrically energized relays). Thus, the root cause of this incident is a management deficiency, programmatic in nature.

A contributing factor to this event is that the procedure for installation of this modification had no specific guidance or warnings to the craft personnel on the sensitivity of these panelboards. The procedure could have forewarned and specified a better method available to the craft personnel to prevent this incident.

Another contributing factor to this incident was the use of an 18 tooth per inch saw blade. If the installation procedure had contained precautions concerning panelboard sensitivity, craft personnel may have utilized a finer saw blade which would have induced less vibration, possibly preventing

actuation of the lockout relay.

CORRECTIVE ACTIONS:

The immediate corrective action was to automatically transfer to an available power source.

Subsequent corrective actions were to postpone the modification until the incoming power could be temporarily swapped from CT-3 to another power source for the duration of work on panelboard EB-1.

Planned corrective actions are to:

Revise the Projects Services Manual to reflect the following:

1. Use a standing Maintenance procedure and/or permit for determining equipment that may be affected, tools used, method used, and personnel required. Not only vibration but also other consideration such as saw filings, metal cutout and dust that may effect equipment mounted below or near work should be addressed.

2. Equipment and devices that will be affected by mounting or cutting of panels to be identified by the Support Leader and/or the Accountable Engineer during the writing of the modification procedure including the removal from service of nearby equipment.

Change the training program for craft personnel to provide guidance for appropriate tool selection while working in designated sensitive areas.

Distribute this report for review by appropriate modification accountable engineers.

Generate a list of all modifications located in the field and write a letter requesting that the appropriate Accountable Engineer evaluate their modifications against the proposed corrective actions of this report.

ANALYSIS OF OCCURRENCE:

Undesirable system actuations caused by induced vibration greater than that by which the plant was seismically designed are infrequent events. The seismic operability of the relay is not in question, since the cutting was outside the bounds of a hypothesized seismic event.

The Emergency Power Switching Logic system performed as designed. When

incoming power was lost to Unit-3, a load shed of the nonessential electrical loads occurred, both Keowee Hydro units started, and power was regained to Unit-3 through the Standby Bus within the required amount of time. If this event had occurred while the auxiliaries were being supplied from the main transformer, Unit-3 would not have had a reactor trip. Installation of intricate modifications are normally restricted until the unit is in a refueling outage. Thus mitigating the severity of occurrences.

Modifications causing vibration in panelboards which caused electrical relays to trip have occurred before at Oconee. The occurrences of the 5 previous Startup Transformer lockouts are not related to this incident. Therefore, CT-3 lockout relay actuating is not considered a recurring event. The modification process deficiency involved in previous events is considered a recurring problem along with the negative effects of modification installations on surrounding equipment. The corrective actions of previous events had Accountable Engineers

for modifications review the report only. As a result of this event, changes were made to the installation and review program of modifications. Also, the Accountable Engineers will review this report and make sure all their outstanding modifications meet the new installation criteria. These actions should prevent reoccurrence.

There were no radiological releases as a result of this event. As such, the health and safety of the public were not affected by this event.

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NUCLEAR PRODUCTION

April 3, 1987

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Oconee Nuclear Station, Unit 3
Docket No. 50-287

LER 287/87-02

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 287/87-02 concerning a relay actuation which started both Keowee Hydro units and caused a load shed of non-essential auxiliary loads.

This report is submitted in accordance with Section 50.73(a)(2)(iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

/s/ Hal B. Tucker
Hal B. Tucker

PJN/152/jgm

Attachment

ATTACHMENT # 1 TO ANO # 8704130053 PAGE: 2 of 2

Document Control Desk
April 3, 1987
Page 2

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